2.3 ALTERNATIVES CONSIDERED AND DISMISSED FROM FURTHER CONSIDERATION

During the scoping process, the following three alternatives to the disposal of the material in an ODMDS were suggested:

- Mariana Trench
- Off-island upland placement
- Interim ODMDS (reactivate)

2.3.1 Mariana Trench

The Mariana Trench is located in the Pacific Ocean, approximately 220 nm (400 km) southwest of Guam, and has a maximum depth of approximately 6.8 mi (11 km). The transportation of material to the Mariana Trench would not be economically feasible. Due to the distance required to reach the Mariana, transportation of the material would not be energy efficient and there would be political / jurisdictional considerations associated with disposal so far away of from Guam. Additionally, the unique benthic, near-benthic and thermal vent communities are not fully understood and therefore, potential impacts of introducing material to this environment cannot presently be determined.

2.3.2 Off-island upland placement

The transportation of material to other off-island upland locations would not be economically feasible. The nearest likely location for off-island upland placement, Rota, is greater than 45 nm (80 km) from Apra Harbor, Guam. Due to the distance required to reach Rota or other islands, transportation of the material would not be energy efficient and there would be political / jurisdictional considerations associated with disposal on islands other than Guam. Additionally, the material would have to be handled multiple times to transfer from vessel to barge, from barge to truck, and truck to upland location.

2.3.3 Interim ODMDS

An interim Guam ODMDS was designated (40 CFR, Part 228 Section 14) in 1977, approximately 5.3 mi (8.5 km) northwest of the entrance to Outer Apra Harbor (13° 29’ 30” N, 144° 34’ 30” E). It had a 1,000-yard (914.4-m) radius (see Figure 1-1). The interim designation was approved for the disposal of dredged material from Apra Harbor, Guam; however, the designation was never finalized, and as a result no dredged material was disposed at the site. The designation expired in 1997. The process for designating an ODMDS is more stringent today than in 1977. The interim site is constrained by multiple screening criteria assessed in the ZSF study (refer to Section 2.2), including being situated with regulated navigation lanes—creating a potential navigation hazard—and is no longer a suitable ODMDS alternative.

2.4 NORTH ALTERNATIVE ODMDS

This section describes the site-specific characteristics of the North Alternative ODMDS, and how dredged material discharged at this location would deposit on the seafloor.

2.4.1 Description of the North ODMDS

Under the North Alternative ODMDS, USEPA would designate an ODMDS north of Outer Apra Harbor (Figure 2-4). The North Study Area is approximately 12.4 nm (23.0 km) offshore of Guam. This northern region occupies an area approximately 17 square nm (58 km^2) and depth at target sampling areas ranged from approximately 6,560 ft to 7,710 ft (2,000 m to 2,350 m). The Sampling and Analysis Plan (SAP) for the ODMDS sampled random target stations within

the North Study Area and determined the physical and biological characteristics to be homogeneous across the overall site (Weston Solutions and Belt Collins 2007a). Since the characteristics of the target stations were highly similar, the location at 13° 41.300' N and 144° 36.500' E was chosen as the Northwest ODMDS alternative, based on flatter bathymetry and proximity to Apra Harbor.

The North ODMDS is approximately 13.7 nm (25.4 km) offshore of Guam (Figure 2.4) and occurs at a depth of approximately 6,560 ft (2,000 m). The discharge zone on the surface would be round, with a radius of 1,640 ft (500 m) at the center of the site. The overall boundary of the disposal site is the outer extent of the area on the bottom of the ocean where maximum deposition of 0.4 in (1 cm) is predicted to occur if 1,000,000 cy (764,600 m^3) of dredged material were disposed in one year. This area is defined as a circle approximately 3.1 nm (5.0 km) in diameter. Figure 2-3 shows that the North ODMDS meets the ZSF characteristics.

There would be no temporary or permanent infrastructure constructed to support the ODMDS designation or use. Access to the ODMDS would be via established commercial shipping lanes.

2.4.2 Fate of Dredged Material Discharged at the North ODMDS

Dredged material discharged at the North ODMDS would settle through the water column, disperse under the influence of local oceanographic currents until ultimately depositing on the seafloor. The fate and transport of dredged material was modeled using grain size data characteristic of sediments likely to be dredged from Apra Harbor, Guam and *in situ* measurements of oceanographic currents collected near the proposed disposal site. Under the worst-case scenario (the discharge of 1,000,000 cy [764,555 m^3] of coarse-grained dredged material during a given year), the maximum footprint of dredged material deposits greater than 0.4 in (1 cm) would be roughly circular in shape with a diameter of approximately 2.8 mi (4.6 km) and cover an area of approximately 6.4 sq. mi (16.7 km^2). Deposits greater than 3.9 in (10 cm) would be contained within an area of only 0.58 sq. mi (1.51 km^2) and deposits greater than 7.9 in (20 cm) would be contained within an area of only 0.36 sq. mi (0.92 km^2). The maximum thickness of accumulated dredged material under this scenario would be 25.6 in (64.9 cm) and would decrease to approximately 4.3 in (10.8 cm) within 3,000 ft (914 m) from the center of the disposal site.

Additional information regarding the fate and transport model (STFATE) used to predict the area of dredged material deposits and the thickness of dredged material accumulations on the seafloor is located in Section 4.1.4 (Environmental Consequences to Regional Geology).

2.5 NORTHWEST ALTERNATIVE ODMDS

This section describes the site-specific characteristics of the Northwest Alternative ODMDS, and how dredged material discharged at this location would deposit on the seafloor.

2.5.1 Description of the Northwest ODMDS

Under the Northwest Alternative ODMDS, USEPA would designate an ODMDS northwest of Outer Apra Harbor (Figure 2-4). The Northwest Study Area is approximately 8.9 nm (16.4 km) offshore of Guam. This region occupies an area approximately 45 sq. nm (152 km^2) and depth at target sampling areas ranged from approximately 8,200 ft to 9,055 ft (2,500 m to 2,760 m). The SAP for the ODMDS sampled random target stations within the Northwest Study Area and determined the physical and biological characteristics to be homogeneous across the overall site (Weston Solutions and Belt Collins 2007a). Since the characteristics of the target stations were highly similar, the location at 13° 35.500' N and 144° 28.733' E was chosen as the Northwest ODMDS alternative, based on flatter bathymetry and proximity to Apra Harbor.

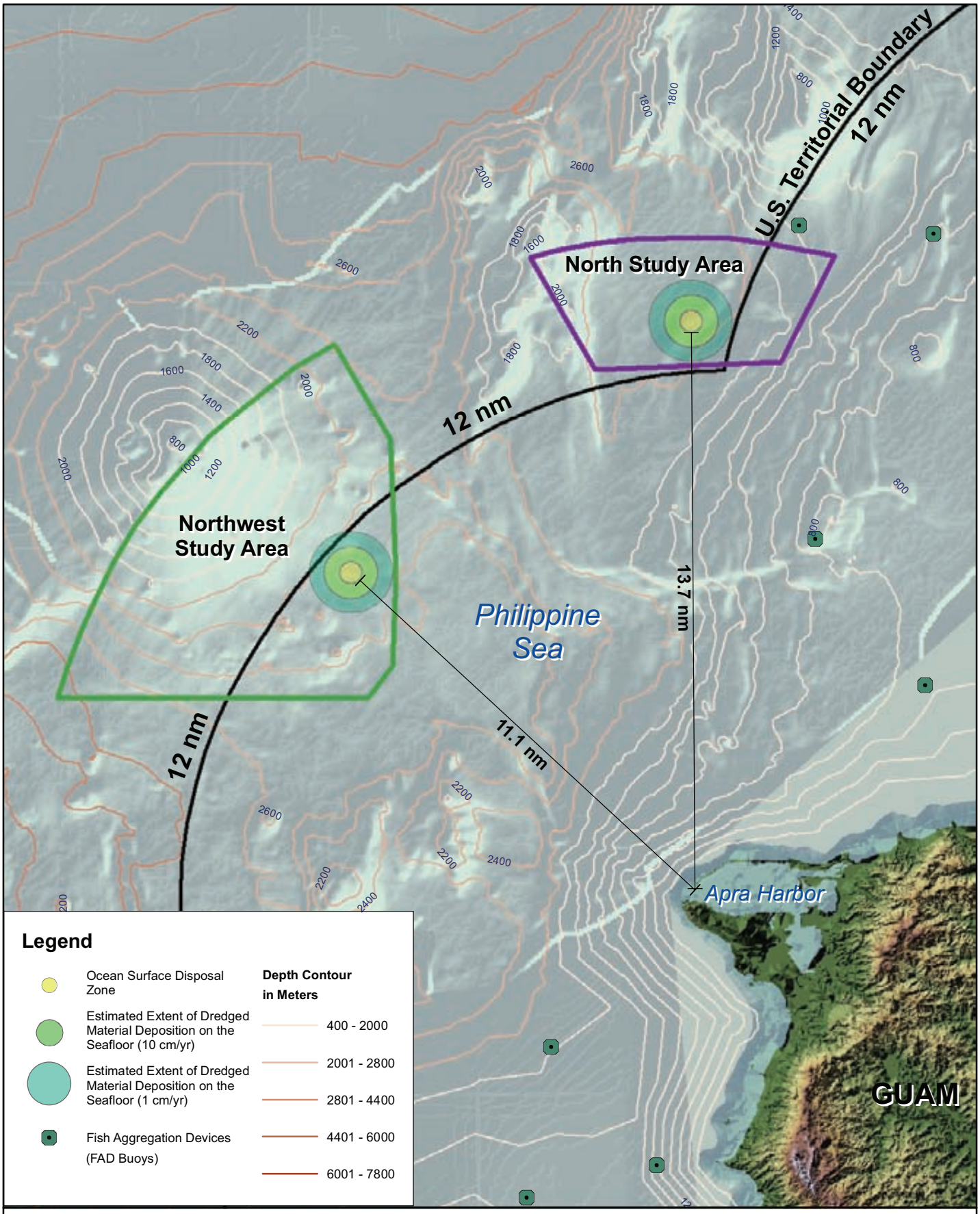

Figure 2-4
ODMDS
Alternatives

The Northwest ODMDS is approximately 11.1 nm (20.6 km) offshore of Guam (see Figure 2-4), and occurs at a depth of approximately 8,200 ft (2,500 m). The discharge zone on the surface would be round, with a radius of 1,640 ft (500 m) at the center of the site. The overall boundary of the disposal site is the outer extent of the area on the bottom of the ocean where maximum deposition of 0.4 in (1 cm) is predicted to occur if 1,000,000 cy (764,600 m^3) of dredged material were disposed in one year. This area is defined as a circle approximately 3.1 nm (5.0 km) in diameter. Figure 2-3 shows that the Northwest ODMDS meets the ZSF characteristics.

There would be no temporary or permanent infrastructure constructed to support the ODMDS designation or use. Access to the ODMDS would be via established commercial shipping lanes.

2.5.2 Fate of Dredged Material Discharged at the Northwest ODMDS

Dredged material discharged at the Northwest ODMDS would settle through the water column, disperse under the influence of local oceanographic currents until ultimately depositing on the seafloor. The fate and transport of dredged material was modeled using grain size data characteristic of sediments likely to be dredged from Apra Harbor, Guam and *in situ* measurements of oceanographic currents collected near the proposed disposal site. Under the worst-case scenario (the discharge of 1,000,000 cy [764,555 m^3] of coarse-grained dredged material during a given year), the maximum footprint of dredged material deposits greater than 0.4 in (1 cm) would be roughly circular in shape with a diameter of approximately 3.0 mi (4.8 km) and cover an area of approximately 7.0 sq. mi (18.0 km^2). Deposits greater than 3.9 in (10 cm) would be contained within an area of only 0.56 sq. mi (1.45 km^2) and deposits greater than 7.9 in (20 cm) would be contained within an area of only 0.34 sq. mi (0.89 km^2). The maximum thickness of accumulated dredged material under this scenario would be 24.2 in (61.4 cm) and would decrease to approximately 4.0 in (10.2 cm) within 3,000 ft (914 m) from the center of the disposal site. Additional information regarding the fate and transport model (STFATE) used to predict the area of dredged material deposits and the thickness of dredged material accumulations on the seafloor is located in Section 4.1.4 (Environmental Consequences to Regional Geology).

2.6 NO ACTION ALTERNATIVE

Under the No Action Alternative, USEPA would not designate an ODMDS for Guam. Guam would rely on the two existing management options for dredged material: 1) beneficial use and 2) upland dewatering sites. As described in Section 1.3, additional beneficial uses and dewatering facilities would need to be identified and constructed to manage the anticipated volume of dredged material.

The Dredged Material Upland Placement Study identified five feasible alternatives for upland placement of dredged material (see Weston Solutions and TEC 2008a). All of the sites would require one or more of the following: site construction and maintenance, relocation of utility (power, sewer, or water) lines, and/or relocation of structures. Each of the alternatives would have the capacity to accommodate maintenance dredging scheduled for 2010, but would be insufficient to handle maximum volumes projected for reasonably foreseeable projects. Without the designation of an ODMDS, multiple upland disposal sites would be required to accommodate the dredging needs of projects anticipated in the reasonably foreseeable future.

Existing stockpiles of dewatered material are growing and there is currently not enough capacity to handle anticipated future projects. Present beneficial use opportunities are insufficient to appreciably reduce existing stockpiled material. Current upland dewatering sites are expected to exceed capacity even without the construction to support the proposed Guam and

Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation. Under the No Action Alternative, future projects could be delayed if a designated ODMDS is not available.

2.7 COMPLIANCE WITH USEPA CRITERIA

This section summarizes the assessment of the two alternative ODMDSs and their consistency with the USEPA general and specific criteria for the selection of a location for an ODMDS. Sections 3 and 4 of this EIS provide a more detailed discussion of the assessment.

2.7.1 General Criteria (40 CFR 228.5)

Table 2-2 of this section presents an assessment of the extent to which the two alternative ODMDS meet the five general site selection criteria 40 CFR 228.5 (a) to (e). Both sites meet the general criteria.

Table 2-2. Compliance with General Criteria (40 CFR 228.5)

Statute	Compliance
40 CFR 228.5(a)	The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation. The ZSF specifically screened the marine environment to avoid areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.
40 CFR 228.5(b)	Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery. Both alternative site boundaries are located sufficiently from shore (minimum 10.5 nm [19.5 km]) and fishery resources to allow water quality perturbations caused by dispersion of disposal material to be reduced to ambient conditions before reaching environmentally sensitive areas.
40 CFR 228.5(c)	If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated. The interim ODMDS established for Guam does not meet current USEPA criteria. It was never used and the designation was terminated.
40 CFR 228.5(d)	The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study. The size and shape of the alternative ODMDS has been determined by computer modeling to limit environmental impacts to the surrounding area and facilitate surveillance and monitoring operations. The designation of the size, configuration, and location of sites was determined as part of this evaluation study.

Statute	Compliance
40 CFR 228.5(e)	USEPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used. The island of Guam is volcanic and not part of a continental land mass and does not have a continental shelf. In the absence of a shelf break, continental shelf can be defined as submerged land between shoreline and depth of 656 ft (200 m). On Guam, this typically occurs within 1 nm (1.9 km) of shore. The slope tends to increase rapidly offshore of Guam and depths can reach 6,000 ft (1.829 km) within 3 nm (5.6 km) (Weston Solutions and Belt Collins 2006). The center points of both ODMDS alternative sites are well beyond the continental shelf, with the closest ODMDS being 11.1 nm (20.6 km) from the shoreline. No ocean dumping sites have been used for Guam dredging projects.

2.7.2 Specific Site Selection Criteria (40 CFR 228.6)

Table 2-3 summarizes the evaluation of the ODMDS alternatives against the USEPA Specific Site Selection Criteria (40 CFR 228.6 (a)). More detail on the existing conditions and potential environmental impacts is presented in Sections 3 and 4.

Table 2-3. ODMDS Alternatives and USEPA Specific Site Selection Criteria

		ODMDS – North Alternative	ODMDS – Northwest Alternative
1	Geographical position, depth of water, bottom topography, and distance from the coast.	Centered at 13° 41.300' N and 144° 36.500' E and 13.7 nm (25.4 km) from Apra Harbor. The bottom topography at the site is flat and the depth is 7,415 ft (2,260 m). (see Figure 2-4).	Centered at 13° 35.500' N and 144° 28.733' E and 11.1 nm (20.6 km) from Apra Harbor. The bottom topography at the site is flat and the depth is 8,790 ft (2,680 m). (see Figure 2-4).
2	Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.	Due to the marine open water locale of this site, the presence of aerial, pelagic, or benthic living resources is likely within these areas, though the site location, water depth and sparse biological communities would minimize any potential impacts to pelagic and benthic resources.	Same as North Alternative
3	Location in relation to beaches and other amenity areas.	The site is greater than 8.0 nm (14.8 km) from the jurisdictional 3nm coastal zone boundary and unlikely to interfere with coastal amenities. Slightly more visible from the coast.	The site is greater than 10.0 nm (18.5 km) from the jurisdictional 3nm coastal zone boundary and unlikely to interfere with coastal amenities. Less visible.
4	Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.	Dredged material to be disposed will likely be fine-grained material (clays and silts) originating from the Inner Apra Harbor area and coarser-grained material (sands and gravels) originating from the Outer Apra Harbor area. Maximum annual dredged material volumes would be set at 1 mcy (764,555 m^3). Dredged material is expected to be released from split hull barges and no packaging of waste is proposed. Greater transport distance	Same as North Alternative, but less exhaust generated.

		ODMDS – North Alternative	ODMDS – Northwest Alternative
		would generate more exhaust.	
5	Feasibility of surveillance and monitoring.	USEPA (and USACE for federal projects in consultation with USEPA) is responsible for site and compliance monitoring. USCG is responsible for vessel traffic-related monitoring. Monitoring of the disposal site is feasible and facilitated through use of a remote tracking system as specified in the SMMP.	Same as North Alternative
6	Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.	Oceanographic current velocities are greatest at the surface due to atmospheric circulation (i.e., wind) driven events while intermediate and bottom layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable resulting in a 2.86 mile diameter footprint of deposits greater than 1 cm.	Oceanographic current velocities are greatest at the surface due to atmospheric circulation (i.e., wind) driven events while intermediate and bottom layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable resulting in a 2.98 mile diameter footprint of deposits greater than 1 cm.
7	Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).	No evidence of previous dumping activities was observed during field reconnaissance and there are no designated discharge areas in the vicinity.	Same as North Alternative
8	Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.	Minor short-term interferences with commercial and recreational boat traffic due to the transport of dredged material along established shipping lanes to/from ODMDS. There is no oil or other mineral extraction platforms offshore of Guam. The site has not been identified as an area of special scientific importance. There are no fish/shellfish culture enterprises near the site. There may be recreational vessels passing through the site, but the area is not a recreational destination.	Same as North Alternative, but further from FADs.
9	Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.	Water quality is excellent with no evidence of degradation.	Same as North Alternative
10	Potentiality for the development or recruitment of nuisance species in the disposal site.	Unknown, but due to the great water depth and temperature differences between the disposal site and the potential near shore dredge areas it is unlikely that any transported nuisance species would survive at the ODMDS.	Same as North Alternative

		ODMDS – North Alternative	ODMDS – Northwest Alternative
11	Existence at, or in close proximity to, the site of any significant natural or cultural features of historical importance.	No culturally significant natural or cultural features were identified in the vicinity of the ODMDS.	Same as North Alternative

2.8 COMPARISON OF ALTERNATIVES

No significant adverse impacts were identified under either ODMDS alternative and no mitigation is proposed (Table 2-4).

Table 2-4. ODMDS Alternatives, Summary of Impacts

		ODMDS – North Alternative	ODMDS – Northwest Alternative
1	Air Quality	Less than Significant	Same as North Alternative
2	Water Quality	Less than Significant	Same as North Alternative
3	Sediment Quality	Less than Significant	Same as North Alternative
4	Marine Birds, Mammals and Fish	Less than Significant	Same as North Alternative
5.	Benthic Communities	Less than Significant	Same as North Alternative
6	Threatened and Endangered Species	Less than Significant	Same as North Alternative
7	Marine Protected Areas	Less than Significant	Same as North Alternative
8	Recreational Use	Less than Significant	Same as North Alternative
9	Commercial Use	Less than Significant	Same as North Alternative
10	Cultural Resources	Less than Significant	Same as North Alternative
11	Public Health and Welfare	Less than Significant	Same as North Alternative

2.9 PREFERRED ALTERNATIVE

Based upon a comparison of the two ODMDS alternatives, the Northwest Alternative is the Preferred Alternative. Both ODMDS alternatives meet the five general site selection criteria 40 CFR 228.5 (a) to (e) and USEPA Specific Site Selection Criteria (40 CFR 228.6 (a). The ODMDS alternatives are not readily distinguishable from each other based on water quality and sediment quality. Additionally, both ODMDS alternatives have similar physical and biological properties and potential for less than significant impacts to resource areas evaluated in the DEIS (see Table 2-4). The Northwest Alternative is farther away from FADS and the Visual Resource Area defined in the ZSF than the North Alternative (see Figure 2-3). By reducing the distance needed to travel to the ODMDS, the already less-than-significant potential impacts to air quality are further reduced in addition to reductions in fossil-fuel consumption, operational duration, and operating costs. Because of the similarities of the two ODMDS alternatives, the closest alternative, the Northwest Alternative, is the Preferred Alternative.

[This page intentionally left blank]